2024 ICIP Training Project Cost Estimating

PRESENTED BY PATRICIA BOLLIGER AND JERRY PAZ

Agenda

1. Background Information
2. Cost Estimating – Drinking Water Infrastructure
3. Cost Estimating – Wastewater Infrastructure
4. Cost Estimating – Roadways
5. Cost Estimating – Buildings
6. Questions

Background Information

Purpose of Training

- Provide communities simplified methods to estimate costs for projects in an Infrastructure Capital Improvement Plan (ICIP).
- Provide magnitude of costs. Should not be used for funding applications.
- Convey that estimating is time-sensitive.

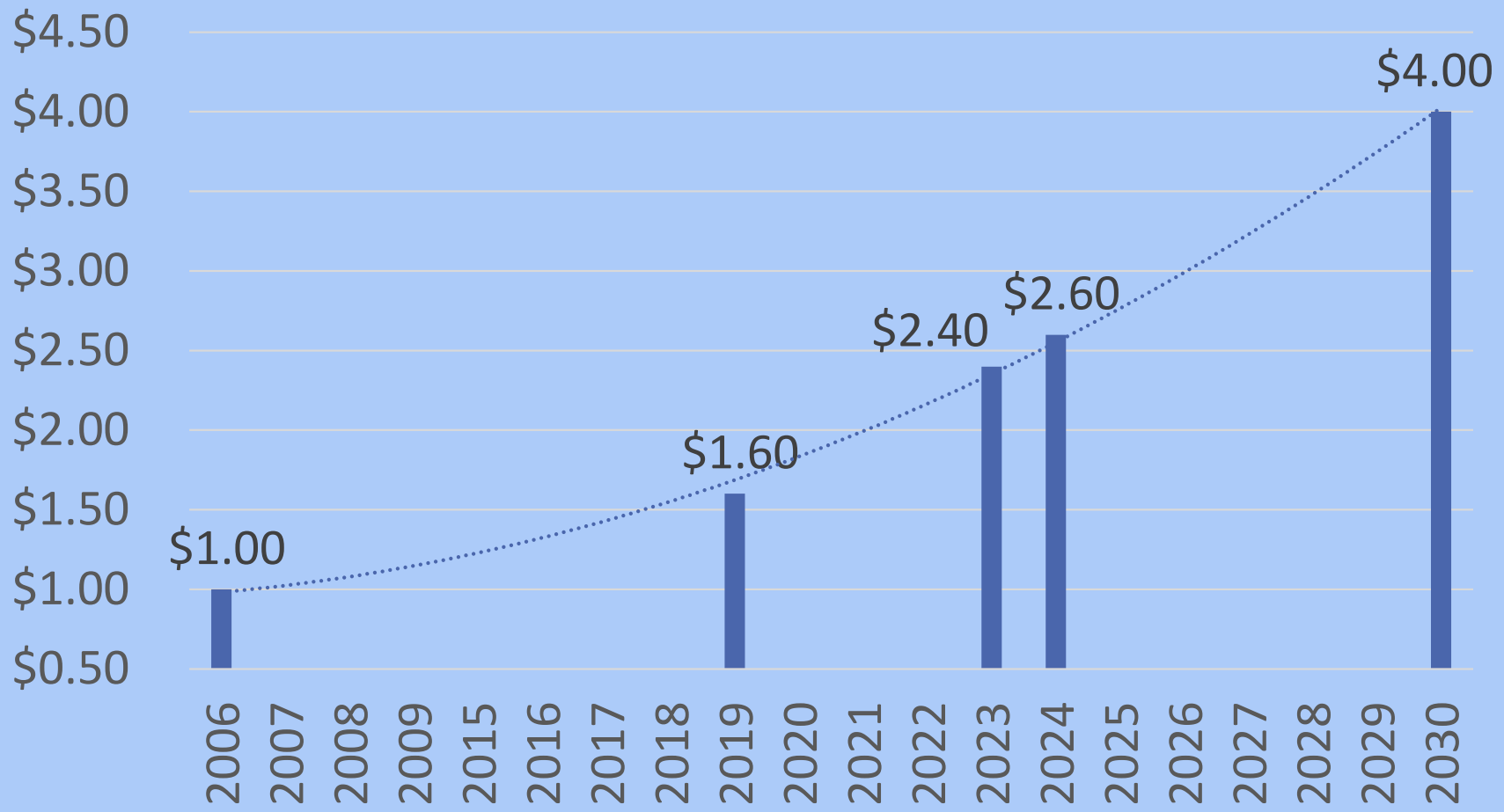
Additional Sources for Cost Estimates

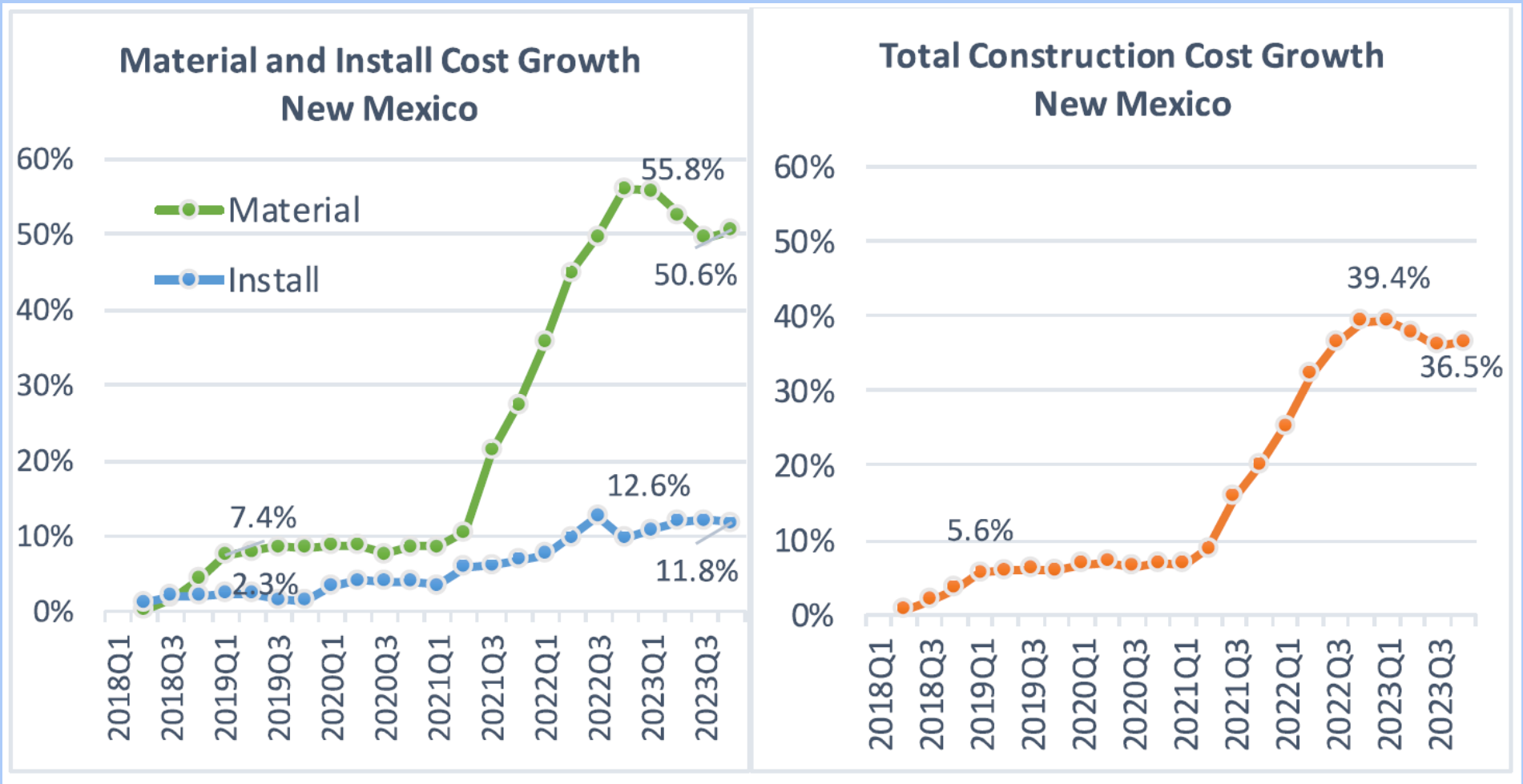
Planning	Design	Construction
• Preliminary Engineering Report • Infrastructure Master Plan • Asset Management Plan • Comprehensive Plan • Project Scoping Report • Rate Study	• Develop plans and specifications • Estimate quantities • Prepare bid items • Develop a construction cost estimate	• Review plans and specifications • Determine the required labor, equipment, material, overhead, risk, and profit

General Factors Influencing Construction Bids

- Applicable Standards
- Market Conditions
- **Cost and Availability of Labor, Equipment, and Materials**
- Time of Year Bids are Solicited
- Time Allocated for Construction
- Size of Project
- Location of Project
- Risks Associated with Project

Construction Costs from 2006-2030





SOURCE: RSMEANS CITY COST INDEX ANALYSIS FOR NEW MEXICO; DECEMBER 2023

Equipment & Material Supply

- Equipment, material, and delivery truck driver shortages – expect longer lead times
- Quotes are difficult to obtain and expire quickly
- Build America Buy America Act (BABAA)
- Fuel surcharges affect material delivery costs
- Limited number of suppliers
- Shortages of parts for used equipment

Ways to Manage Costs

- Ramp-up Time: Allows for ordering of equipment and material.
- Schedule: Allow for longer construction durations to account for smaller construction crews, fewer crews, and no weekend work.
- Share Risk: Agree on some level of price escalation to share risk with the contractor (works both ways) and budget for the escalation.
- Expedite Submittal Review: Begin submittal review immediately after award.
- Stockpile Materials: Not an option in many small communities and can be risky for funding agencies.
- Allow the contractor to propose a Cost Savings Proposal and split the savings with the Owner.
- Consider alternative delivery options.

Volatile Construction Cost Market

- Update estimate before bid phase
- Bid alternates
- Regulatory priority
- Wants vs. Needs (may need to pay upfront for extra analysis)
- Add at least 10% contingency
- Add at least 10% market escalation
- Take what you learn here and **ADD 35% – 50%**

Cost Estimating

DRINKING WATER INFRASTRUCTURE

Main Components of a Drinking Water System

Source	Treatment	Storage	Distribution
• Identify source water • Remove water from the source	• Test source water • Treat the water to appropriate standards	• Store water for peak usage times, fire flow, and emergency	• Distribute water through underground pipe system

Drinking Water System Basis of Cost Estimation

Water Source

- Groundwater = well, pump, and disinfection process
- Surface water = treatment plant

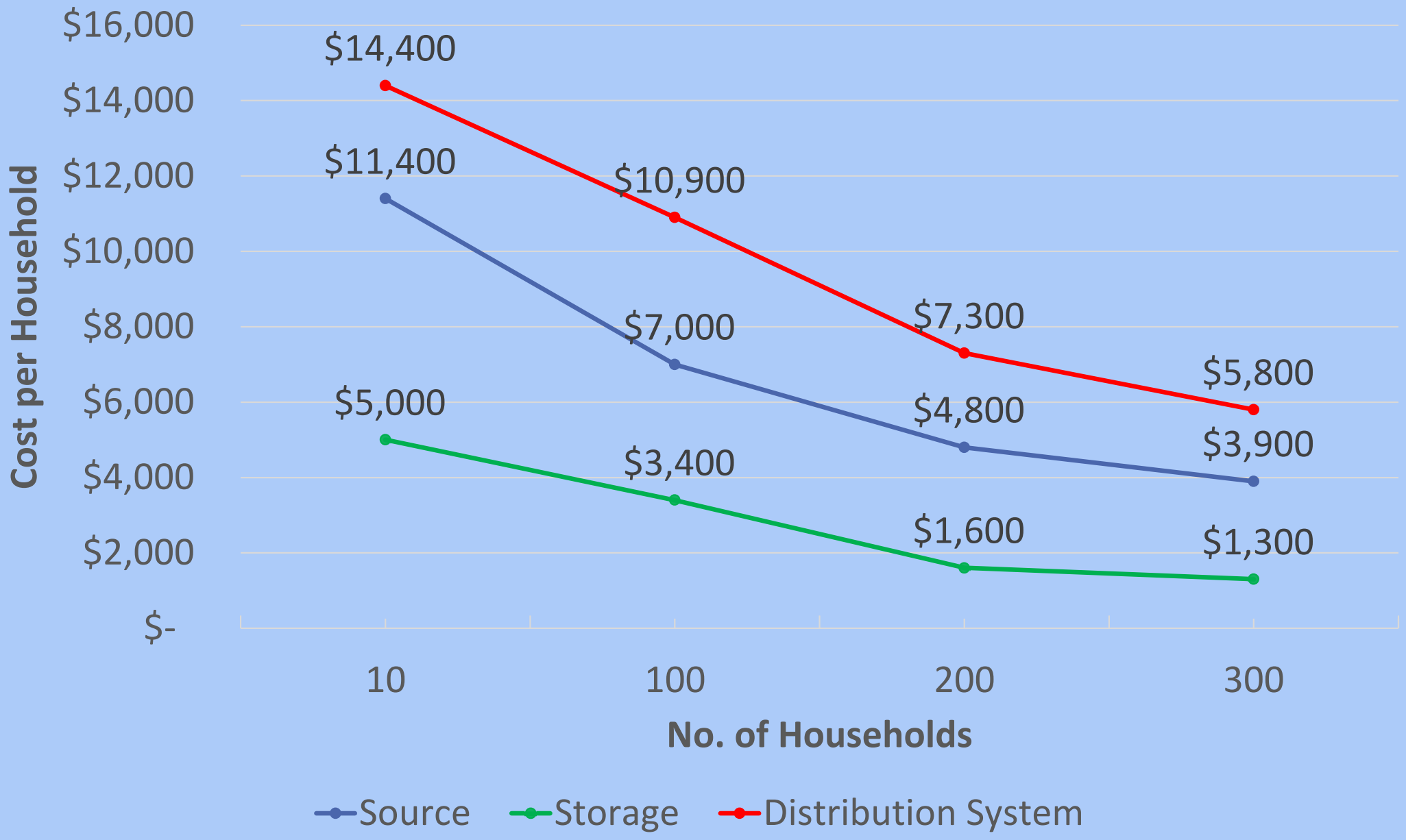
Basis of Cost Estimation

- Groundwater system serving ≤ 300 households
- Groundwater system serving > 300 households
- Surface water treatment system

Groundwater Systems ≤ 300 Households

- Based on the number of households (not population)
- Estimate Cost for:
  - Source (well, pump, and disinfection)
  - Storage tank
  - Distribution system
- Cost Estimating Procedure
  1. Use the graph on the following slide to estimate the cost per household. Multiply the cost per household by the number of households served.

2024 Costs per Household

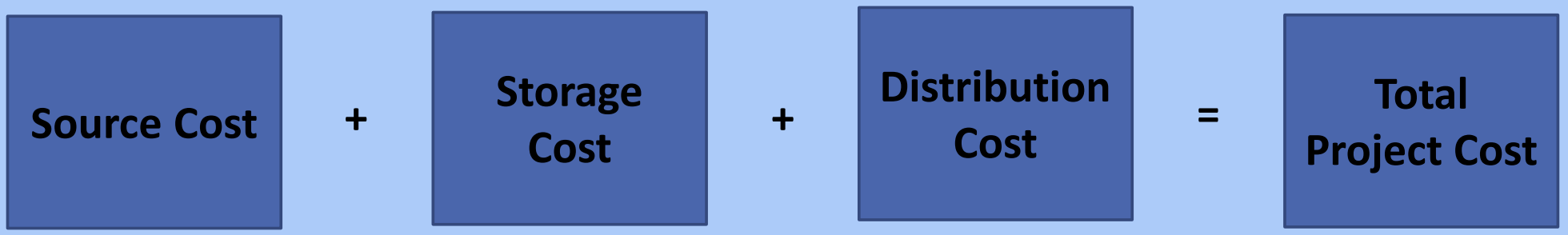


Groundwater Systems ≤ 300 Households

Cost per Household	x	**No. of Households**	=	**Water Source Cost**
Cost per Household	x	**No. of Households**	=	**Water Storage Cost**
Cost per Household	x	**No. of Households**	=	**Water Distribution Cost**

Groundwater Systems ≤ 300 Households

2. Add Source, Storage, and Distribution costs to get the Total Project Cost.



Cost Estimate Assumptions:

- Distribution Cost includes pipe and installation of meters.
- Cost includes engineering, inspection, and construction.
- Cost does not include well drilling, pump and controls, well house, and chlorination equipment.
- Does not include construction contingency or market escalation.
- Does not include operations and maintenance costs.

Groundwater System Serving > 300 Households

- Based on linear feet of pipe needed and depth of well to be drilled.
- Estimate Cost for:
  - Source (well, pump, and disinfection)
  - Storage tank
  - Distribution system
- Cost Estimating Procedure
  1. Well Cost. Estimate the depth of well and corresponding diameter and cost per foot. Costs include drilling, casing, screen, pump test, and well development.

Diameter of Well (in)	Well < 500 ft (cost per ft)	Well = 500 ft (cost per ft)	Well > 500 ft (cost per ft)
6	$320	$290	N/A
8	N/A	$350	$320

Groundwater System Serving > 300 Households

2. Multiply Depth of Well by Cost per Foot.

Depth of Well (ft)	X	Cost per Foot ($/ft)	=	Well Cost

3. Pump Cost. Estimate the cost of the pump using the below table.

Diameter of Well (in)	Cost for Well < 500 ft	Cost for Well = 500 ft	Cost for Well > 500 ft
6	$8,100	$16,200	N/A
8	N/A	$16,200	$32,500 - $80,600

Groundwater System Serving > 300 Households

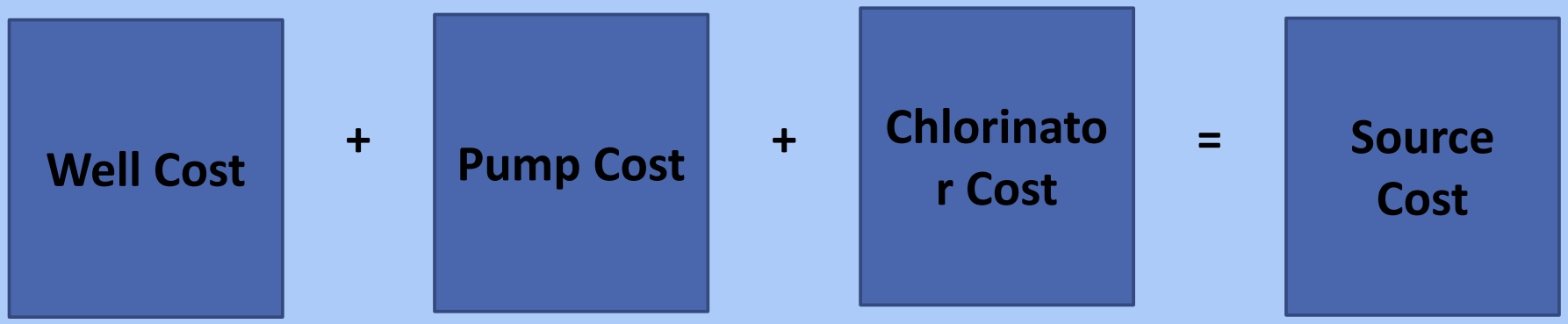
4. Chlorinator Cost. Estimate the Cost of Chlorinator using the following table.

Chlorinator	Cost
Small Well (300-500 households or 110-180 gpm)	$1,000 - $1,700
Medium Well (500-700 households or 180-225 gpm)	$1,700 - $2,600
Large Well (700-900 households or 255-330 gpm)	$2,600 - $3,900

- Consider multiple pumps and wells. It is a good idea to have redundant wells and pumps within a system to plan for problems with pumps, wells, or supply quantity. The same procedure may be followed for multiple wells.

Groundwater System Serving > 300 Households

5. Subtotal Cost for Water Source. Sum of Well Cost(s), Pump Cost(s), and Chlorinator Cost(s).



Groundwater System Serving > 300 Households

Storage Cost Estimating Procedure:

1. Consider factors affecting tank cost. Size, type of tank, construction conditions.
2. Determine storage needed.
   a. If replacing tank with sufficient size, estimate same size tank.
   b. If adding storage, the new tank size = total storage capacity – existing tank size.
   c. Approx. recommended total storage capacity = two-day use + fire flow storage (based on number of households served and assuming an average of 2.5 persons per household).

No. of Households	Min. Recommended Storage Volume (gallons)
300	260,000
400	330,000
500	400,000

Groundwater System Serving > 300 Households

4. Determine cost per gallon based on size of tank.

Size of Tank (gallons)	Cost Range ($/gallon)
Less than 50,000	$0.80 – $1.00
50,000 - 75,000	$1.00 - $1.20
75,000 - 300,000	$1.20 - $1.30
300,000 - 500,000	$1.30 - $2.50
500,000 – 1,000,000	$2.50 - $3.30

5. Multiply Storage Volume by Cost per Gallon to determine Total Tank Cost.

Storage Volume (gallons) **X** **Cost per Gallon** **=** **Total Tank Cost**

Groundwater System Serving > 300 Households

- Use 6- to 8-inch pipe for a general estimate.
- Cost includes the cost of standard construction, pipe materials, and labor.
- Rocky conditions = significantly higher cost
- Estimate the length of distribution pipe needed (Google Earth, GPS unity, or car odometer).
- Water Distribution Cost estimating procedure:
  1. Estimate cost per linear foot using the following table.

Pipe Diameter	Cost per Linear Foot	Notes
4-inch	$85	Maximum flow of 225 gpm
6-inch	$92	Minimum needed for fire flow
8-inch	$102	Maximum flow of 1,000 gpm
10-inch	$116	Maximum flow of 1,500 gpm

Groundwater System Serving > 300 Households

2. Multiply the Linear Feet of Distribution Pipe by the Cost per Linear Foot to obtain the Distribution Cost.

Linear Feet of Distribution Pipe **x** **Cost per Linear Foot** **=** **Distribution Cost**

- Estimate Total Project Cost by adding the Water Source Cost, Water Storage Cost, and Water Distribution Cost.

Source Cost **+** **Storage Cost** **+** **Distribution Cost** **=** **Total Project Cost**

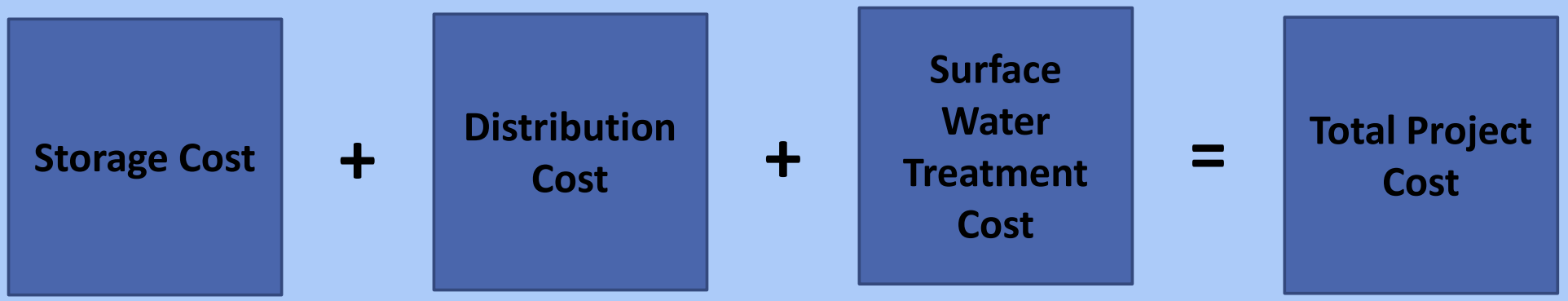
Surface Water Treatment System

- Costs for storage and distribution systems can be estimated using the previous groundwater system methods (depending on number of households).
- This method estimates construction costs for a new water treatment facility and does not include operations and maintenance costs.
- Rule of thumb = 2.5 persons per household and 100 gallons per capita per day.
- Estimate cost of surface water treatment system using the following table:

No. of Households	Size of Surface Water Treatment Facility	Cost per Gallon of Water
Greater than 3,000	1,000,000 gallons or more per day	$4.10
2,000 - 3,000	750,000 gallons or more per day	$5.10
1,500 - 2,000	500,000 gallons or more per day	$6.50
Less than 1,500	Less than 500,000 gallons per day	$8.40 - $9.70

Surface Water Treatment System

- Estimate Total Project Cost by adding Storage Cost, Distribution Cost, and Surface Water Treatment System Cost.



Cost Estimating

WASTEWATER INFRASTRUCTURE

Main Components of a Wastewater System

Collection	Treatment	Effluent Disposal
• Collects wastewater generated and conveys it to the treatment system/facility	• Treats the wastewater generated to meet permit requirements	• Disposes of treated effluent per permit requirements

Considerations for Choosing Treatment System/Facility

- Quality/quantity of flow
- Characteristics of raw influent wastewater
- Quality/quantity of effluent desired
- Type of discharge (surface water, groundwater, irrigation, etc.)
- Permit conditions
- Acceptable degree of O&M
- Quality/quantity of land available
- Physical characteristics of the area (soil, groundwater, bedrock, topography, etc.)

Considerations for Choosing Effluent Disposal Method

- Discharge to nearby surface water - need EPA NPDES permit.
- Discharge to groundwater (irrigation, infiltration, injection, etc.) - need NMED Groundwater Discharge permit.
- Discharge by evaporation - very land intensive.

Wastewater System Basis of Cost Estimation

- For collection and treatment only, not for discharge (too variable)
- Does not include ROW, land acquisition, or O&M
- New construction, not upgrade or expansion
- Flowrate of 100 gallons per capita per day (gpcd) and 2.5 persons per household are assumed.
- Does not include extreme conditions, such as dewatering, bedrock, etc.

Collection System Alternatives			
Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$66,500	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Vacuum Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$39,800	
Semi-Rural (1 - 3 acres per household)		$31,000	
Semi-Urban (0.5 - 1.0 acre per household)		$22,800	
Urban (Less than 0.5 acre per household)		$16,500	
Small Diameter Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$38,300	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Grinder Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$47,500	
Semi-Rural (1 - 3 acres per household)		$47,500	
Semi-Urban (0.5 - 1.0 acre per household)		$31,600	
Urban (Less than 0.5 acre per household)		$25,800	
Septic Tank Effluent Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$50,400	
Semi-Rural (1 - 3 acres per household)		$42,200	
Semi-Urban (0.5 - 1.0 acre per household)		$34,600	
Urban (Less than 0.5 acre per household)		$28,700	

Pump Station Estimated Cost

Classification	No. of Households	Cost per Household	Subtotal
Fewer than 100 households		$4,600	
100 to 500 households	100	$2,100	$210,000
More than 500 households		$900	

Treatment Facility Estimated Cost

No. of Households	Size of Wastewater Treatment Facility	Range of Cost per Gallon of Wastewater Treated
≤ 3,000	≤ 1,000,000 gallons per day	$17 - $26
> 3,000	> 1,000,000 gallons per day	$26 - $33

No. of Households x **250 gallons per household per day** x **Cost per Gallon** = **Treatment Facility Cost**

Cost Estimating

ROADWAYS INFRASTRUCTURE

Primary Roadway Construction Cost Components

- Earthwork – Cutting, Filling, Shaping
- Surfacing – Subgrade Prep, Base, Surface
- Drainage – Roadway, Cross Drainage
- Structures – Bridges, Retaining Walls
- Traffic – Signing, Striping, Signals, MOT
- Utilities – Adjustment of Existing Utilities
- Landscaping / Aesthetic Enhancements
- Other – Mobilization, Testing, Staking, etc.

Factors Affecting Roadway Construction Cost

- Terrain and Geographic Features
- Project Type - Rehabilitation, Reconstruction or New Construction
- Traffic Load / Roadway Function – Local, Collector, Arterial
- Urbanization – Curb & Gutter, Sidewalks
- Drainage Features
- Utilities Affecting Project
- Enhancements / Constraints – Safety, Environmental, Aesthetic, etc.

Average Earthwork Cost per Mile

Roadway Type	Driving Lanes	Road Top Width	Significant Cuts and Fills along Mainline	Major Widening in Mountain to Hilly Terrain	Widening in Flat to Moderate Terrain	Blading and Shaping Only
Local Streets	2 DL	24-28 ft	$470,000	$240,000	$140,000	$60,000
Collector	2 DL	36-40 ft	$770,000	$390,000	$220,000	$70,000
Collector	2 DL & CTL	52-56 ft	$1,000,000	$510,000	$270,000	$90,000
Collector	4 DL & CTL	72-76 ft	$1,330,000	$670,000	$340,000	$130,000

Average Roadway Surfacing Cost per Mile

- Urban sections – include curb and gutter

Roadway Type	Driving Lanes	Roadway Top Width	New Surfacing Constr. Hot Mix Asphalt (HMA)	Process Existing Surfacing and Overlay w/ Hot Mix Asphalt	Mill and Process Existing Surfacing & Overlay w/ Hot Mix Asphalt	New Surfacing Constr. Double Penetr.
Local Streets	2 DL	24-28 ft	$850,000	$570,000	$800,000	$470,000
Collector	2 DL	36-40 ft	$1,140,000	$1,020,000	$980,000	$0
Collector	2 DL & CTL	52-56 ft	$1,540,000	$1,360,000	$1,270,000	$0
Collector	4 DL & CTL	72-76 ft	$2,290,000	$1,920,000	$1,870,000	$0

Average Cost for Roadway Urbanization Enhancements per Mile

Item	Type	Cost/Mile
Curb and Gutter w/ Drive-pads and ADA Compliant Corners	New Construction – Both Sides of Roadway	$480,000
Sidewalk	New Construction – Both Sides of Roadway	$520,000
Raised Median Incl Curb & Gutter and Median Pavement	New Construction	$730,000
Raised Median Incl Curb & Gutter, No Median Pavement	New Construction	$280,000
ADA Compliant Corners and Drive-Pads	Street Rehabilitation	$190,000

Average Cost for Drainage Improvements

Structure	Unit	Unit Costs
Bridge/CBC (Large Drainage)	Surface Area	$420/SF
Storm Drain System	Per Center Line Mi	$3,240,000/Mi
Cross Drainage	24” CMP & End Treatment	$190/LF
	36” CMP & End Treatment	$290/LF
	48” CMP & End Treatment	$320/LF
	60” CMP & End Treatment	$360/LF

Other Construction Costs

Items	Type	Add % to Total Cost for Earthwork, Surfacing, Urbanization and Drainage
Mobilization		10%
Traffic Control	Signing, Striping, Management of Traffic	7.5%
Other	Quality Assurance, Utility Adjustments, Construction Staking, Demolition	7.5%
Signalization		$420,000/Signal

Example of Cost Estimate for 0.5 Mi of Local Street, Urbanized with 1- 60" CMP

Description	Unit	Unit Cost	Amount
Earthwork – Widening (flat to moderate) ½ Mi	Mi	$141,000	$76,000
Surfacing – New Surfacing ½ Mi	Mi	$856,000	$434,000
Urbanization – New Constr. w/ Curb & Gutter, ADA Compliant Drive-pads and Corners – ½ Mi	Mi	$477,000	$239,000
Drainage – 80 LF of 60" CMP & End Treatments	LF	$360	$28,800
		Subtotal	**$778,000**
Mobilization, Traffic and Other Costs	%	25% of Subtotal	$195,000
		Subtotal	**$973,000**
Gross Receipts Tax and Contingencies	%	28% of Above	$273,000
Construction Cost			$1,248,000
Engineering and other Professional Costs	%	22% of Constr.	$275,000
		Total Project Costs	**$1,523,000**

Cost Estimating

BUILDINGS

Primary Building Construction Components

- Civil- Site, Parking Lot
- Structural – Foundation, Str Framework Mechanical – Plumbing, HVAC
- Electrical – Wiring, Lighting
- Fire Suppression – Sprinkler, Alarms
- Architectural – Thermal/Moisture Interior/Exterior Finishes
- Landscaping

Factors Affecting Building Specific Costs

- Site Terrain and Availability of Utilities
- Soil Conditions
- Structural Complexity
- Exterior and Interior Finish Levels
- General Building Construction Type
- Heating, Venting, Cooling System Level

Administration Buildings

Population to be Served	Range of Typical Building Size	Typical Cost Per Square Foot (SF)
Under 5,000	2,000 to 5,000 SF	$290
5,000 to 10,000	5,000 to 6,500 SF	$280
Over 10,000	6,500 to 8,000 SF	$250

Community Centers

Population to be Served	Range of Typical Building Size	Typical Costs per Square Foot (SF)
Under 8,000	10,000 to 20,000 SF	$230
Over 8,000	20,000 to 30,000 SF	$210

Fire Stations

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 SF	$330
2,000 to 5,000	4,000 SF	$290
5,000 to 10,000	6,000 SF	$240
Over 10,000	8,000 SF	$230

Libraries

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 to 2,500 SF	$370
2,000 to 5,000	2,500 to 3,500 SF	$370
5,000 to 10,000	3,500 to 7,000 SF	$370
Over 10,000	7,000 SF to 10,000 SF	$350

Maintenance Buildings

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 5,000	10,000 SF	$210
5,000 to 10,000	20,000 SF	$170
Over 10,000	30,000 SF	$160

Site Work

- Dependent on number of parking spaces required. Use 1 parking space for every 300 SF of building space.
- Cost includes grading and shaping, subgrade prep, base course, hot mix asphalt, curb, and front sidewalk.
- For construction cost use **$3,370 per Parking Space**.

Example of Cost Estimate for New Library– 6,000 SF

Description	Unit	Unit Costs	Amount
Building	6000 SF	$370/SF	$2,220,000
Site Work	20 Parking Spaces	$3,370/ Parking Space	$67,400
		Sub-Total	**$2,287,400**
GRT		8% of above	$182,992
		Sub-Total	**$2,470,392**
Architectural / Engineering		15% of above	$370,559
Total			**$2,850,000**
Add 35-50% for Market Escalation			$997,500 - $1,425,000
Total Project Cost			**$3,847,500 - $4,275,000**

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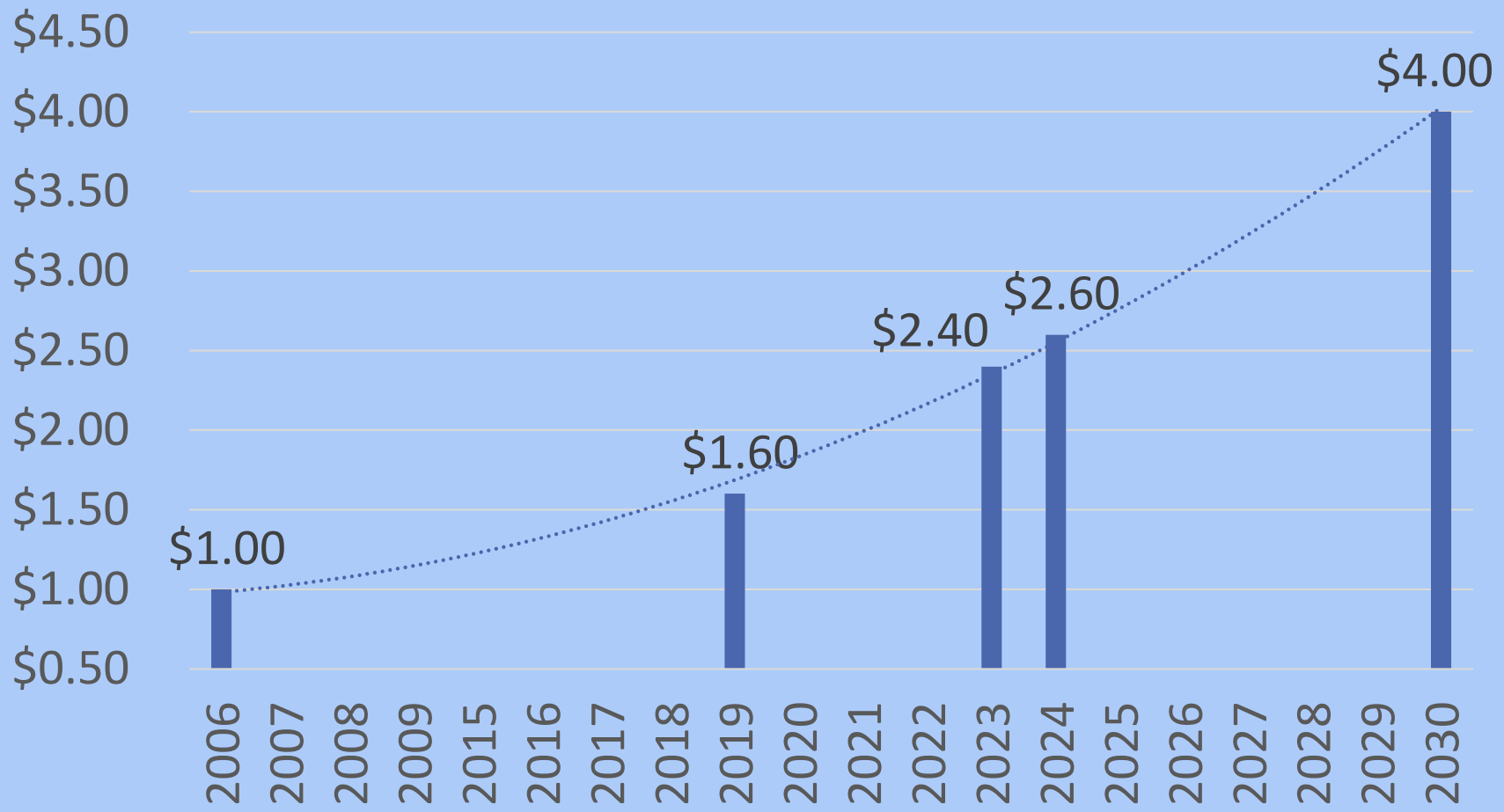

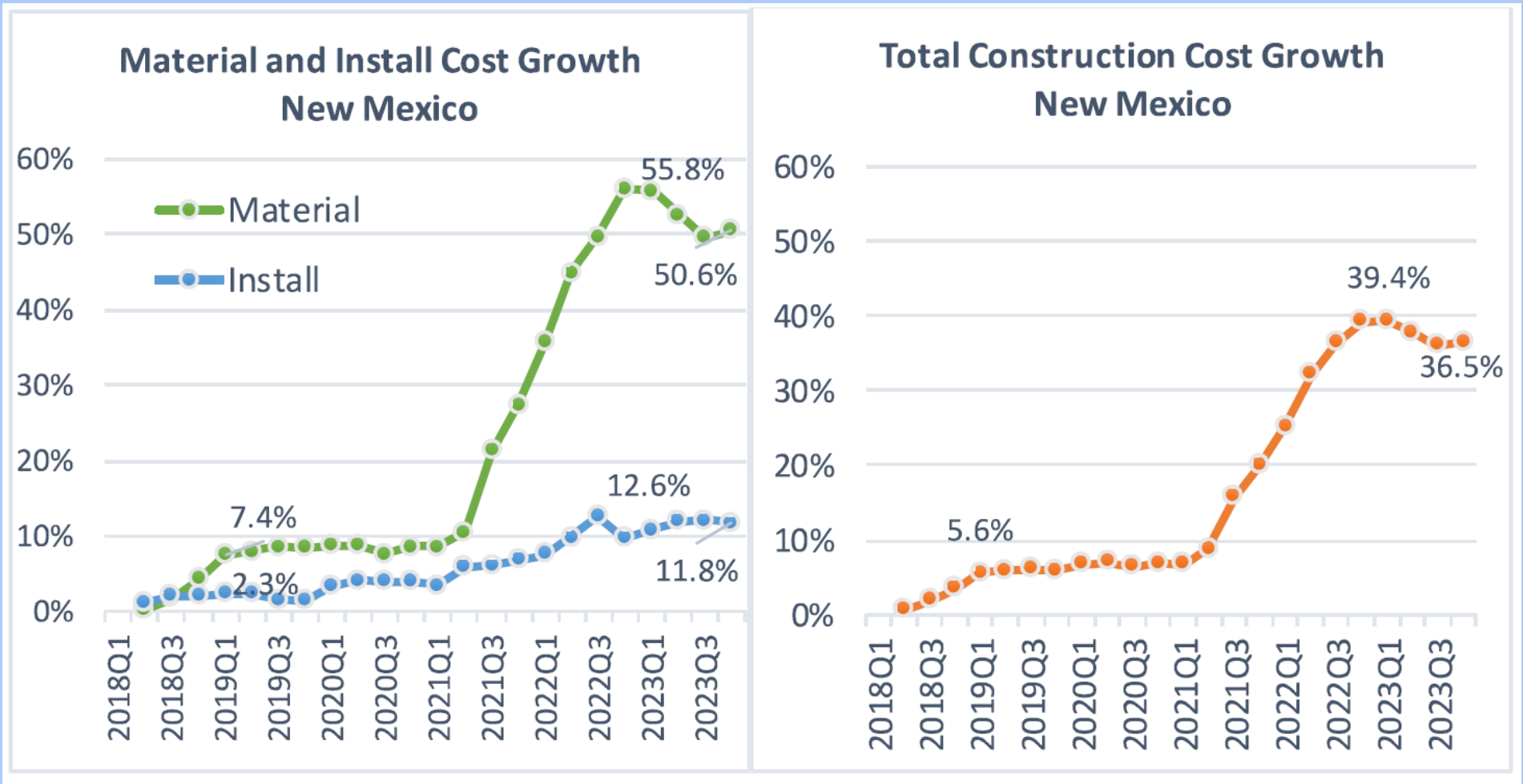

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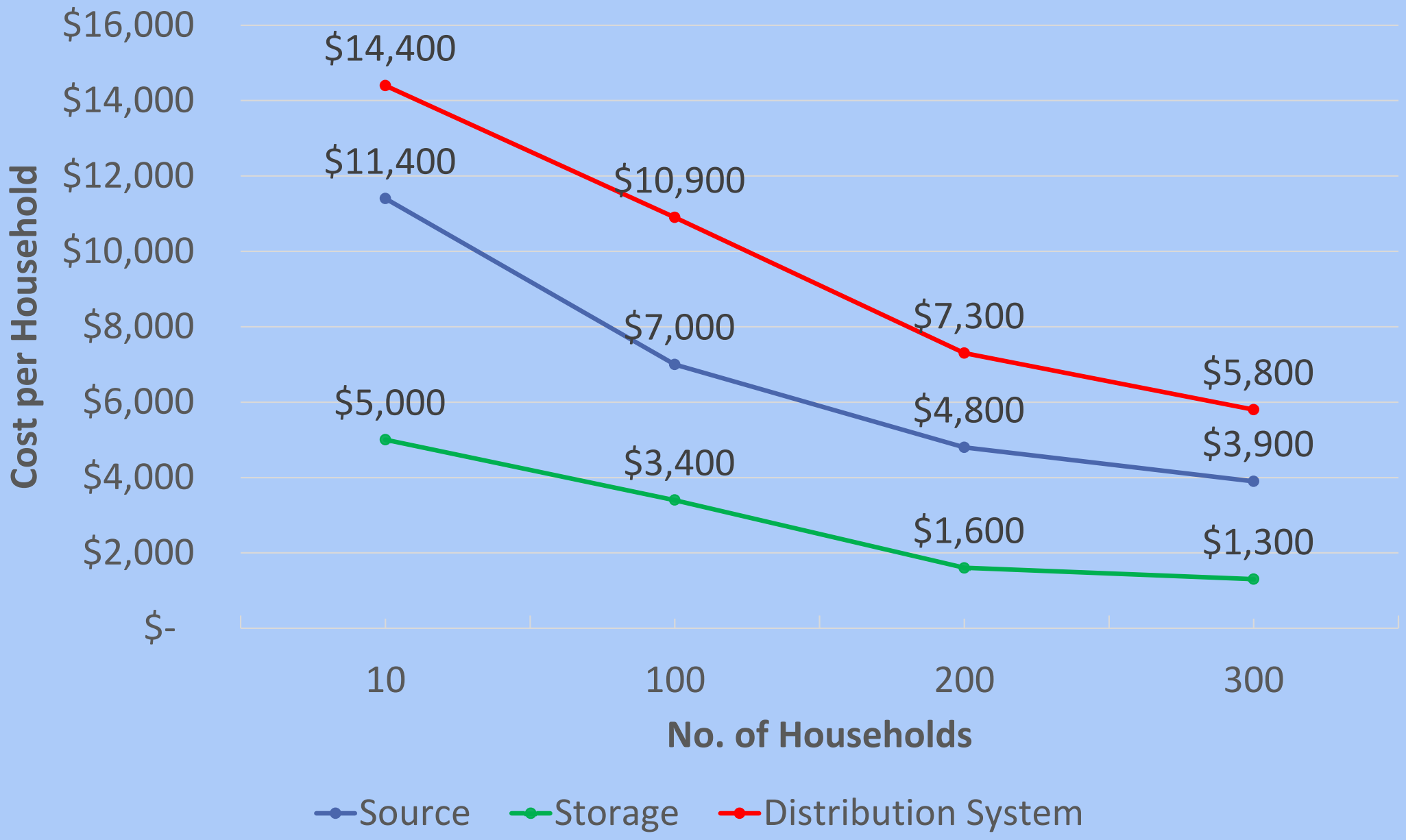
2024 Costs per Household



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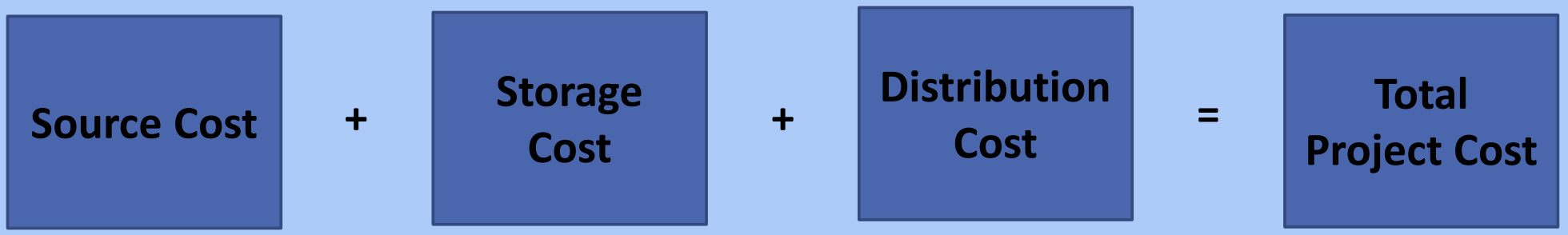
Cost per Household	x	**No. of Households**	=	**Water Distribution Cost**

Groundwater Systems ≤ 300 Households

2. Add Source, Storage, and Distribution costs to get the Total Project Cost.



Cost Estimate Assumptions:

- Distribution Cost includes pipe and installation of meters.
- Cost includes engineering, inspection, and construction.
- Cost does not include well drilling, pump and controls, well house, and chlorination equipment.
- Does not include construction contingency or market escalation.
- Does not include operations and maintenance costs.

Groundwater System Serving > 300 Households

- Based on linear feet of pipe needed and depth of well to be drilled.
- Estimate Cost for:
  - Source (well, pump, and disinfection)
  - Storage tank
  - Distribution system
- Cost Estimating Procedure
  1. Well Cost. Estimate the depth of well and corresponding diameter and cost per foot. Costs include drilling, casing, screen, pump test, and well development.

Diameter of Well (in)	Well < 500 ft (cost per ft)	Well = 500 ft (cost per ft)	Well > 500 ft (cost per ft)
6	$320	$290	N/A
8	N/A	$350	$320

Groundwater System Serving > 300 Households

2. Multiply Depth of Well by Cost per Foot.

Depth of Well (ft)	X	Cost per Foot ($/ft)	=	Well Cost

3. Pump Cost. Estimate the cost of the pump using the below table.

Diameter of Well (in)	Cost for Well < 500 ft	Cost for Well = 500 ft	Cost for Well > 500 ft
6	$8,100	$16,200	N/A
8	N/A	$16,200	$32,500 - $80,600

Groundwater System Serving > 300 Households

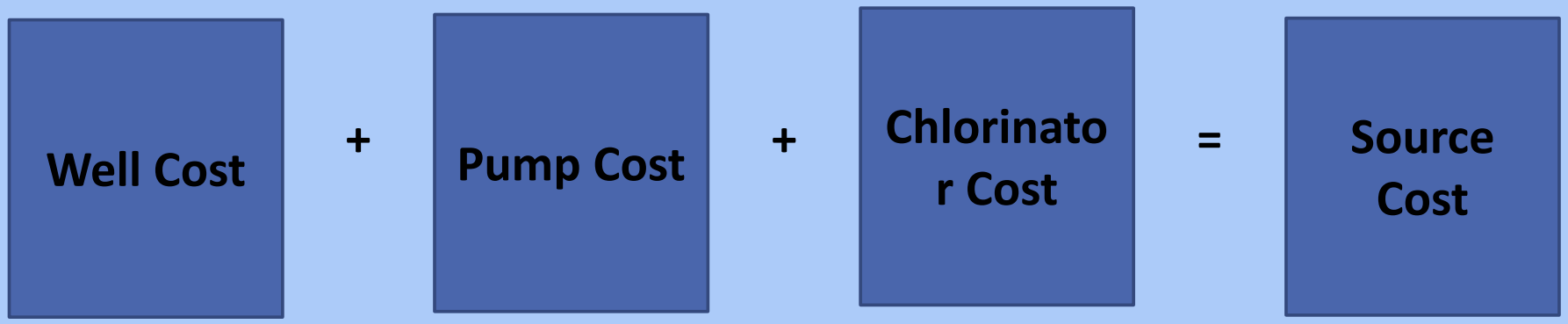
4. Chlorinator Cost. Estimate the Cost of Chlorinator using the following table.

Chlorinator	Cost
Small Well (300-500 households or 110-180 gpm)	$1,000 - $1,700
Medium Well (500-700 households or 180-225 gpm)	$1,700 - $2,600
Large Well (700-900 households or 255-330 gpm)	$2,600 - $3,900

- Consider multiple pumps and wells. It is a good idea to have redundant wells and pumps within a system to plan for problems with pumps, wells, or supply quantity. The same procedure may be followed for multiple wells.

Groundwater System Serving > 300 Households

5. Subtotal Cost for Water Source. Sum of Well Cost(s), Pump Cost(s), and Chlorinator Cost(s).



Groundwater System Serving > 300 Households

Storage Cost Estimating Procedure:

1. Consider factors affecting tank cost. Size, type of tank, construction conditions.
2. Determine storage needed.
   a. If replacing tank with sufficient size, estimate same size tank.
   b. If adding storage, the new tank size = total storage capacity – existing tank size.
   c. Approx. recommended total storage capacity = two-day use + fire flow storage (based on number of households served and assuming an average of 2.5 persons per household).

No. of Households	Min. Recommended Storage Volume (gallons)
300	260,000
400	330,000
500	400,000

Groundwater System Serving > 300 Households

4. Determine cost per gallon based on size of tank.

Size of Tank (gallons)	Cost Range ($/gallon)
Less than 50,000	$0.80 – $1.00
50,000 - 75,000	$1.00 - $1.20
75,000 - 300,000	$1.20 - $1.30
300,000 - 500,000	$1.30 - $2.50
500,000 – 1,000,000	$2.50 - $3.30

5. Multiply Storage Volume by Cost per Gallon to determine Total Tank Cost.

Storage Volume (gallons) **X** **Cost per Gallon** **=** **Total Tank Cost**

Groundwater System Serving > 300 Households

- Use 6- to 8-inch pipe for a general estimate.
- Cost includes the cost of standard construction, pipe materials, and labor.
- Rocky conditions = significantly higher cost
- Estimate the length of distribution pipe needed (Google Earth, GPS unity, or car odometer).
- Water Distribution Cost estimating procedure:
  1. Estimate cost per linear foot using the following table.

Pipe Diameter	Cost per Linear Foot	Notes
4-inch	$85	Maximum flow of 225 gpm
6-inch	$92	Minimum needed for fire flow
8-inch	$102	Maximum flow of 1,000 gpm
10-inch	$116	Maximum flow of 1,500 gpm

Groundwater System Serving > 300 Households

2. Multiply the Linear Feet of Distribution Pipe by the Cost per Linear Foot to obtain the Distribution Cost.

Linear Feet of Distribution Pipe **x** **Cost per Linear Foot** **=** **Distribution Cost**

- Estimate Total Project Cost by adding the Water Source Cost, Water Storage Cost, and Water Distribution Cost.

Source Cost **+** **Storage Cost** **+** **Distribution Cost** **=** **Total Project Cost**

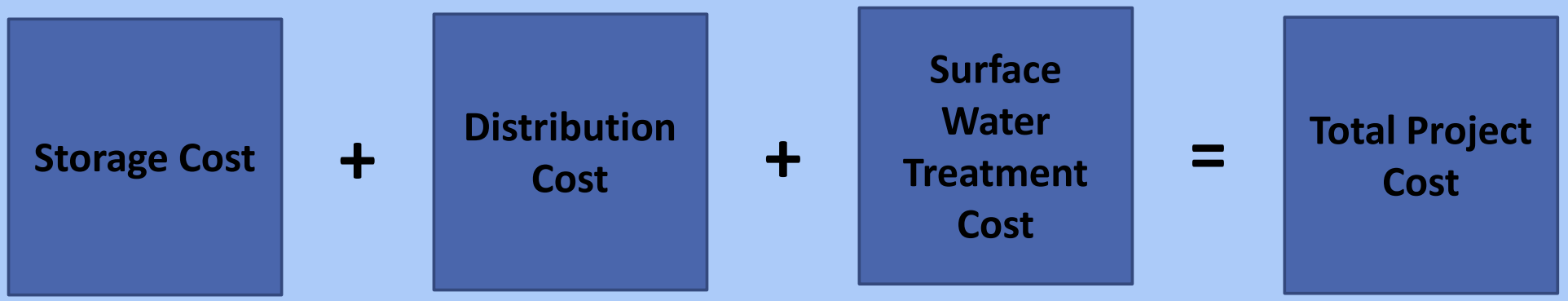
Surface Water Treatment System

- Costs for storage and distribution systems can be estimated using the previous groundwater system methods (depending on number of households).
- This method estimates construction costs for a new water treatment facility and does not include operations and maintenance costs.
- Rule of thumb = 2.5 persons per household and 100 gallons per capita per day.
- Estimate cost of surface water treatment system using the following table:

No. of Households	Size of Surface Water Treatment Facility	Cost per Gallon of Water
Greater than 3,000	1,000,000 gallons or more per day	$4.10
2,000 - 3,000	750,000 gallons or more per day	$5.10
1,500 - 2,000	500,000 gallons or more per day	$6.50
Less than 1,500	Less than 500,000 gallons per day	$8.40 - $9.70

Surface Water Treatment System

- Estimate Total Project Cost by adding Storage Cost, Distribution Cost, and Surface Water Treatment System Cost.



Cost Estimating

WASTEWATER INFRASTRUCTURE

Main Components of a Wastewater System

Collection	Treatment	Effluent Disposal
• Collects wastewater generated and conveys it to the treatment system/facility	• Treats the wastewater generated to meet permit requirements	• Disposes of treated effluent per permit requirements

Considerations for Choosing Treatment System/Facility

- Quality/quantity of flow
- Characteristics of raw influent wastewater
- Quality/quantity of effluent desired
- Type of discharge (surface water, groundwater, irrigation, etc.)
- Permit conditions
- Acceptable degree of O&M
- Quality/quantity of land available
- Physical characteristics of the area (soil, groundwater, bedrock, topography, etc.)

Considerations for Choosing Effluent Disposal Method

- Discharge to nearby surface water - need EPA NPDES permit.
- Discharge to groundwater (irrigation, infiltration, injection, etc.) - need NMED Groundwater Discharge permit.
- Discharge by evaporation - very land intensive.

Wastewater System Basis of Cost Estimation

- For collection and treatment only, not for discharge (too variable)
- Does not include ROW, land acquisition, or O&M
- New construction, not upgrade or expansion
- Flowrate of 100 gallons per capita per day (gpcd) and 2.5 persons per household are assumed.
- Does not include extreme conditions, such as dewatering, bedrock, etc.

Collection System Alternatives			
Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$66,500	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Vacuum Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$39,800	
Semi-Rural (1 - 3 acres per household)		$31,000	
Semi-Urban (0.5 - 1.0 acre per household)		$22,800	
Urban (Less than 0.5 acre per household)		$16,500	
Small Diameter Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$38,300	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Grinder Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$47,500	
Semi-Rural (1 - 3 acres per household)		$47,500	
Semi-Urban (0.5 - 1.0 acre per household)		$31,600	
Urban (Less than 0.5 acre per household)		$25,800	
Septic Tank Effluent Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$50,400	
Semi-Rural (1 - 3 acres per household)		$42,200	
Semi-Urban (0.5 - 1.0 acre per household)		$34,600	
Urban (Less than 0.5 acre per household)		$28,700	

Pump Station Estimated Cost

Classification	No. of Households	Cost per Household	Subtotal
Fewer than 100 households		$4,600	
100 to 500 households	100	$2,100	$210,000
More than 500 households		$900	

Treatment Facility Estimated Cost

No. of Households	Size of Wastewater Treatment Facility	Range of Cost per Gallon of Wastewater Treated
≤ 3,000	≤ 1,000,000 gallons per day	$17 - $26
> 3,000	> 1,000,000 gallons per day	$26 - $33

No. of Households x **250 gallons per household per day** x **Cost per Gallon** = **Treatment Facility Cost**

Cost Estimating

ROADWAYS INFRASTRUCTURE

Primary Roadway Construction Cost Components

- Earthwork – Cutting, Filling, Shaping
- Surfacing – Subgrade Prep, Base, Surface
- Drainage – Roadway, Cross Drainage
- Structures – Bridges, Retaining Walls
- Traffic – Signing, Striping, Signals, MOT
- Utilities – Adjustment of Existing Utilities
- Landscaping / Aesthetic Enhancements
- Other – Mobilization, Testing, Staking, etc.

Factors Affecting Roadway Construction Cost

- Terrain and Geographic Features
- Project Type - Rehabilitation, Reconstruction or New Construction
- Traffic Load / Roadway Function – Local, Collector, Arterial
- Urbanization – Curb & Gutter, Sidewalks
- Drainage Features
- Utilities Affecting Project
- Enhancements / Constraints – Safety, Environmental, Aesthetic, etc.

Average Earthwork Cost per Mile

Roadway Type	Driving Lanes	Road Top Width	Significant Cuts and Fills along Mainline	Major Widening in Mountain to Hilly Terrain	Widening in Flat to Moderate Terrain	Blading and Shaping Only
Local Streets	2 DL	24-28 ft	$470,000	$240,000	$140,000	$60,000
Collector	2 DL	36-40 ft	$770,000	$390,000	$220,000	$70,000
Collector	2 DL & CTL	52-56 ft	$1,000,000	$510,000	$270,000	$90,000
Collector	4 DL & CTL	72-76 ft	$1,330,000	$670,000	$340,000	$130,000

Average Roadway Surfacing Cost per Mile

- Urban sections – include curb and gutter

Roadway Type	Driving Lanes	Roadway Top Width	New Surfacing Constr. Hot Mix Asphalt (HMA)	Process Existing Surfacing and Overlay w/ Hot Mix Asphalt	Mill and Process Existing Surfacing & Overlay w/ Hot Mix Asphalt	New Surfacing Constr. Double Penetr.
Local Streets	2 DL	24-28 ft	$850,000	$570,000	$800,000	$470,000
Collector	2 DL	36-40 ft	$1,140,000	$1,020,000	$980,000	$0
Collector	2 DL & CTL	52-56 ft	$1,540,000	$1,360,000	$1,270,000	$0
Collector	4 DL & CTL	72-76 ft	$2,290,000	$1,920,000	$1,870,000	$0

Average Cost for Roadway Urbanization Enhancements per Mile

Item	Type	Cost/Mile
Curb and Gutter w/ Drive-pads and ADA Compliant Corners	New Construction – Both Sides of Roadway	$480,000
Sidewalk	New Construction – Both Sides of Roadway	$520,000
Raised Median Incl Curb & Gutter and Median Pavement	New Construction	$730,000
Raised Median Incl Curb & Gutter, No Median Pavement	New Construction	$280,000
ADA Compliant Corners and Drive-Pads	Street Rehabilitation	$190,000

Average Cost for Drainage Improvements

Structure	Unit	Unit Costs
Bridge/CBC (Large Drainage)	Surface Area	$420/SF
Storm Drain System	Per Center Line Mi	$3,240,000/Mi
Cross Drainage	24” CMP & End Treatment	$190/LF
	36” CMP & End Treatment	$290/LF
	48” CMP & End Treatment	$320/LF
	60” CMP & End Treatment	$360/LF

Other Construction Costs

Items	Type	Add % to Total Cost for Earthwork, Surfacing, Urbanization and Drainage
Mobilization		10%
Traffic Control	Signing, Striping, Management of Traffic	7.5%
Other	Quality Assurance, Utility Adjustments, Construction Staking, Demolition	7.5%
Signalization		$420,000/Signal

Example of Cost Estimate for 0.5 Mi of Local Street, Urbanized with 1- 60” CMP

Description	Unit	Unit Cost	Amount
Earthwork – Widening (flat to moderate) ½ Mi	Mi	$141,000	$76,000
Surfacing – New Surfacing ½ Mi	Mi	$856,000	$434,000
Urbanization – New Constr. w/ Curb & Gutter, ADA Compliant Drive-pads and Corners – ½ Mi	Mi	$477,000	$239,000
Drainage – 80 LF of 60” CMP & End Treatments	LF	$11,000	$33,000
		Subtotal	**$782,000**
Mobilization, Traffic and Other Costs	%	25% of Subtotal	$195,000
		Subtotal	**$977,000**
Gross Receipts Tax and Contingencies	%	28% of Above	$274,000
Construction Cost			$1,248,000
Engineering and other Professional Costs	%	22% of Constr.	$275,000
		Total Project Costs	**$1,523,000**

Cost Estimating

BUILDINGS

Primary Building Construction Components

- Civil- Site, Parking Lot
- Structural – Foundation, Str Framework Mechanical – Plumbing, HVAC
- Electrical – Wiring, Lighting
- Fire Suppression – Sprinkler, Alarms
- Architectural – Thermal/Moisture Interior/Exterior Finishes
- Landscaping

Factors Affecting Building Specific Costs

- Site Terrain and Availability of Utilities
- Soil Conditions
- Structural Complexity
- Exterior and Interior Finish Levels
- General Building Construction Type
- Heating, Venting, Cooling System Level

Administration Buildings

Population to be Served	Range of Typical Building Size	Typical Cost Per Square Foot (SF)
Under 5,000	2,000 to 5,000 SF	$290
5,000 to 10,000	5,000 to 6,500 SF	$280
Over 10,000	6,500 to 8,000 SF	$250

Community Centers

Population to be Served	Range of Typical Building Size	Typical Costs per Square Foot (SF)
Under 8,000	10,000 to 20,000 SF	$230
Over 8,000	20,000 to 30,000 SF	$210

Fire Stations

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 SF	$330
2,000 to 5,000	4,000 SF	$290
5,000 to 10,000	6,000 SF	$240
Over 10,000	8,000 SF	$230

Libraries

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 to 2,500 SF	$370
2,000 to 5,000	2,500 to 3,500 SF	$370
5,000 to 10,000	3,500 to 7,000 SF	$370
Over 10,000	7,000 SF to 10,000 SF	$350

Maintenance Buildings

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 5,000	10,000 SF	$210
5,000 to 10,000	20,000 SF	$170
Over 10,000	30,000 SF	$160

Site Work

- Dependent on number of parking spaces required. Use 1 parking space for every 300 SF of building space.
- Cost includes grading and shaping, subgrade prep, base course, hot mix asphalt, curb, and front sidewalk.
- For construction cost use **$3,370 per Parking Space**.

Example of Cost Estimate for New Library– 6,000 SF

Description	Unit	Unit Costs	Amount
Building	6000 SF	$370/SF	$2,220,000
Site Work	20 Parking Spaces	$3,370/ Parking Space	$67,400
		Sub-Total	**$2,287,400**
GRT		8% of above	$182,992
		Sub-Total	**$2,470,392**
Architectural / Engineering		15% of above	$370,559
Total			**$2,850,000**
Add 35-50% for Market Escalation			$997,500 - $1,425,000
Total Project Cost			**$3,847,500 - $4,275,000**

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Questions?

2024 ICIP Training Project Cost Estimating

PRESENTED BY PATRICIA BOLLIGER AND JERRY PAZ

Agenda

1. Background Information
2. Cost Estimating – Drinking Water Infrastructure
3. Cost Estimating – Wastewater Infrastructure
4. Cost Estimating – Roadways
5. Cost Estimating – Buildings
6. Questions

Background Information

Purpose of Training

- Provide communities simplified methods to estimate costs for projects in an Infrastructure Capital Improvement Plan (ICIP).
- Provide magnitude of costs. Should not be used for funding applications.
- Convey that estimating is time-sensitive.

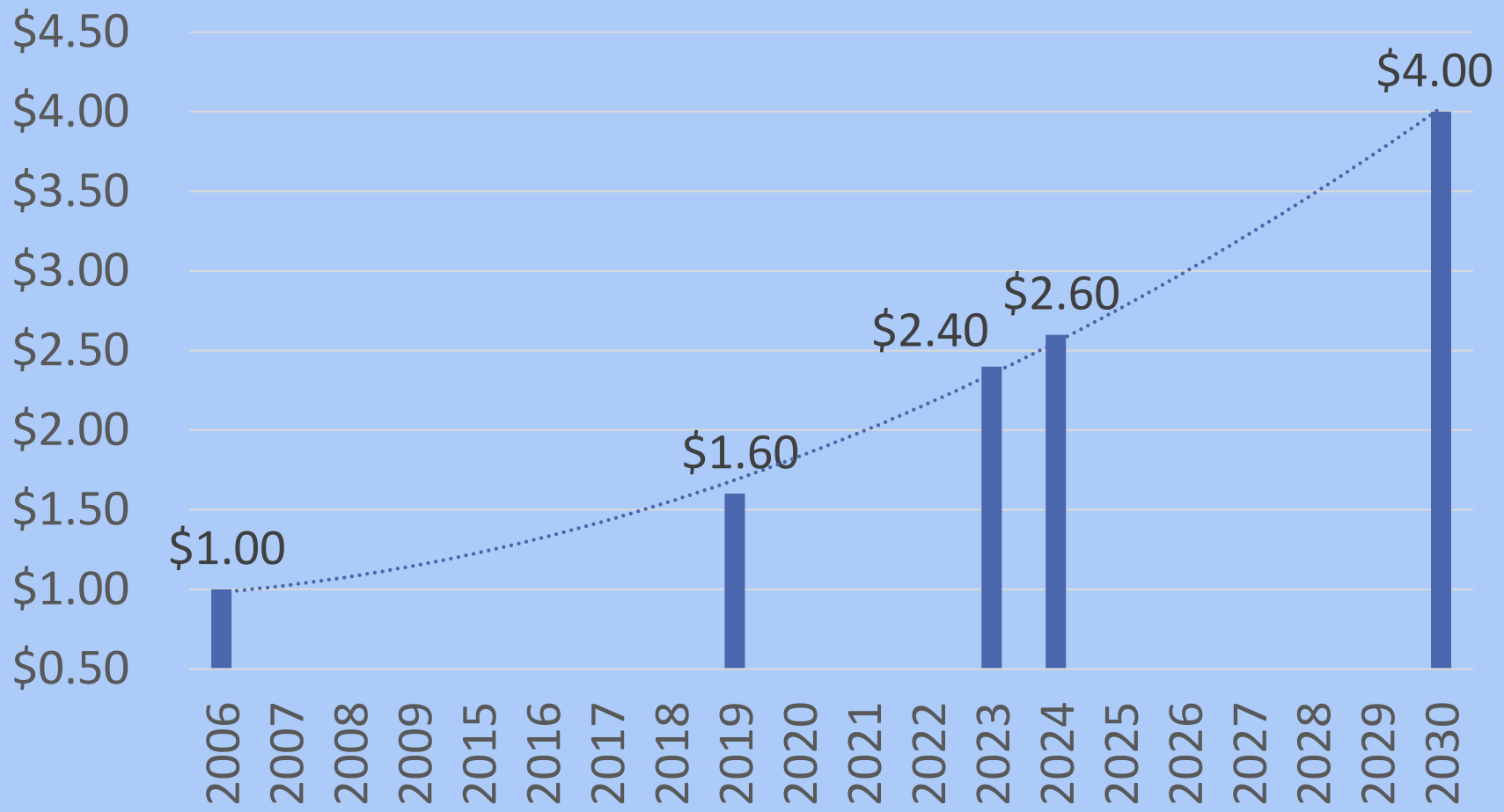
Additional Sources for Cost Estimates

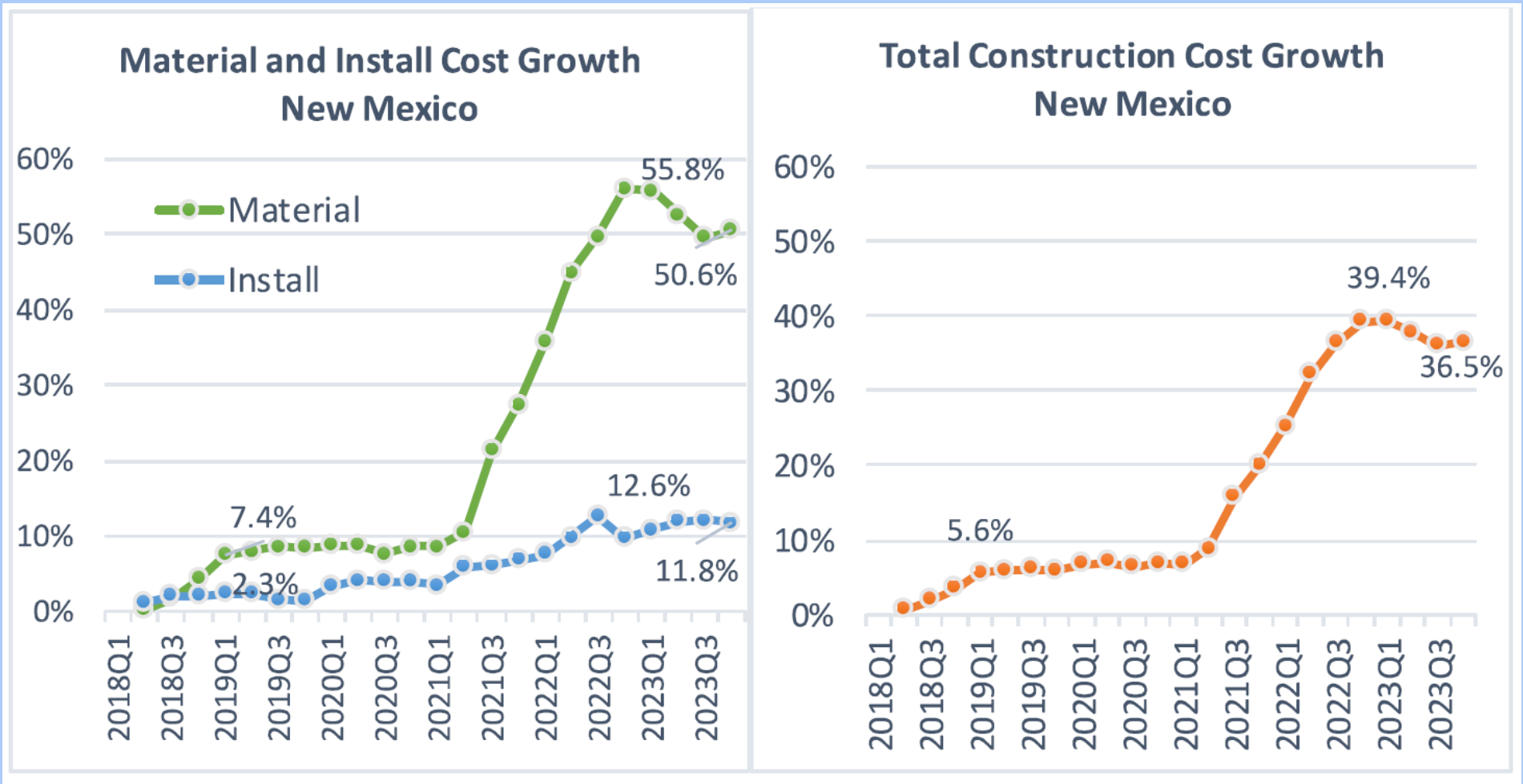
Planning	Design	Construction
• Preliminary Engineering Report • Infrastructure Master Plan • Asset Management Plan • Comprehensive Plan • Project Scoping Report • Rate Study	• Develop plans and specifications • Estimate quantities • Prepare bid items • Develop a construction cost estimate	• Review plans and specifications • Determine the required labor, equipment, material, overhead, risk, and profit

General Factors Influencing Construction Bids

- Applicable Standards
- Market Conditions
- **Cost and Availability of Labor, Equipment, and Materials**
- Time of Year Bids are Solicited
- Time Allocated for Construction
- Size of Project
- Location of Project
- Risks Associated with Project

Construction Costs from 2006-2030





SOURCE: RSMEANS CITY COST INDEX ANALYSIS FOR NEW MEXICO; DECEMBER 2023

Equipment & Material Supply

- Equipment, material, and delivery truck driver shortages – expect longer lead times
- Quotes are difficult to obtain and expire quickly
- Build America Buy America Act (BABAA)
- Fuel surcharges affect material delivery costs
- Limited number of suppliers
- Shortages of parts for used equipment

Ways to Manage Costs

- Ramp-up Time: Allows for ordering of equipment and material.
- Schedule: Allow for longer construction durations to account for smaller construction crews, fewer crews, and no weekend work.
- Share Risk: Agree on some level of price escalation to share risk with the contractor (works both ways) and budget for the escalation.
- Expedite Submittal Review: Begin submittal review immediately after award.
- Stockpile Materials: Not an option in many small communities and can be risky for funding agencies.
- Allow the contractor to propose a Cost Savings Proposal and split the savings with the Owner.
- Consider alternative delivery options.

Volatile Construction Cost Market

- Update estimate before bid phase
- Bid alternates
- Regulatory priority
- Wants vs. Needs (may need to pay upfront for extra analysis)
- Add at least 10% contingency
- Add at least 10% market escalation
- Take what you learn here and **ADD 35% – 50%**

Cost Estimating

DRINKING WATER INFRASTRUCTURE

Main Components of a Drinking Water System

Source	Treatment	Storage	Distribution
• Identify source water • Remove water from the source	• Test source water • Treat the water to appropriate standards	• Store water for peak usage times, fire flow, and emergency	• Distribute water through underground pipe system

Drinking Water System Basis of Cost Estimation

Water Source

- Groundwater = well, pump, and disinfection process
- Surface water = treatment plant

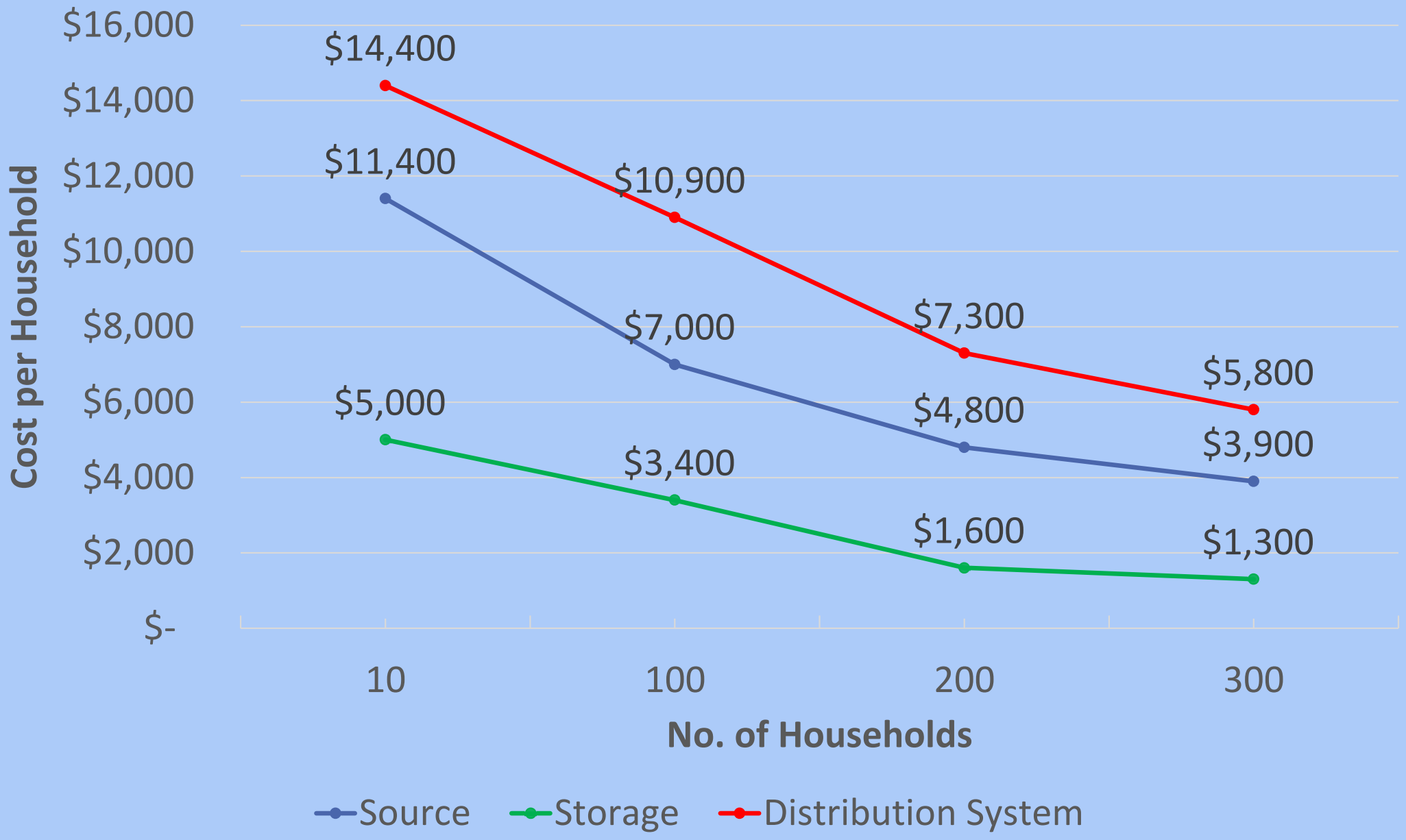
Basis of Cost Estimation

- Groundwater system serving ≤ 300 households
- Groundwater system serving > 300 households
- Surface water treatment system

Groundwater Systems ≤ 300 Households

- Based on the number of households (not population)
- Estimate Cost for:
  - Source (well, pump, and disinfection)
  - Storage tank
  - Distribution system
- Cost Estimating Procedure
  1. Use the graph on the following slide to estimate the cost per household. Multiply the cost per household by the number of households served.

2024 Costs per Household

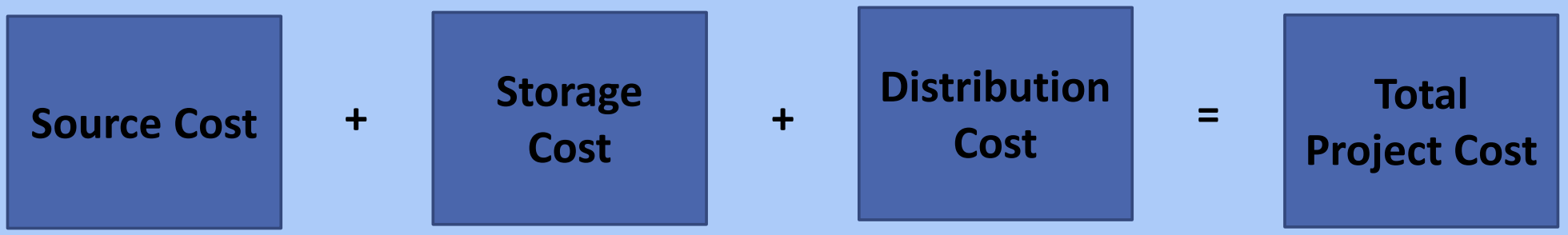


Groundwater Systems ≤ 300 Households

Cost per Household	x	**No. of Households**	=	**Water Source Cost**
Cost per Household	x	**No. of Households**	=	**Water Storage Cost**
Cost per Household	x	**No. of Households**	=	**Water Distribution Cost**

Groundwater Systems ≤ 300 Households

2. Add Source, Storage, and Distribution costs to get the Total Project Cost.



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- Cost includes engineering, inspection, and construction.
- Cost does not include well drilling, pump and controls, well house, and chlorination equipment.
- Does not include construction contingency or market escalation.
- Does not include operations and maintenance costs.

Groundwater System Serving > 300 Households

- Based on linear feet of pipe needed and depth of well to be drilled.
- Estimate Cost for:
  - Source (well, pump, and disinfection)
  - Storage tank
  - Distribution system
- Cost Estimating Procedure
  1. Well Cost. Estimate the depth of well and corresponding diameter and cost per foot. Costs include drilling, casing, screen, pump test, and well development.

Diameter of Well (in)	Well < 500 ft (cost per ft)	Well = 500 ft (cost per ft)	Well > 500 ft (cost per ft)
6	$320	$290	N/A
8	N/A	$350	$320

Groundwater System Serving > 300 Households

2. Multiply Depth of Well by Cost per Foot.

Depth of Well (ft)	X	Cost per Foot ($/ft)	=	Well Cost

3. Pump Cost. Estimate the cost of the pump using the below table.

Diameter of Well (in)	Cost for Well < 500 ft	Cost for Well = 500 ft	Cost for Well > 500 ft
6	$8,100	$16,200	N/A
8	N/A	$16,200	$32,500 - $80,600

Groundwater System Serving > 300 Households

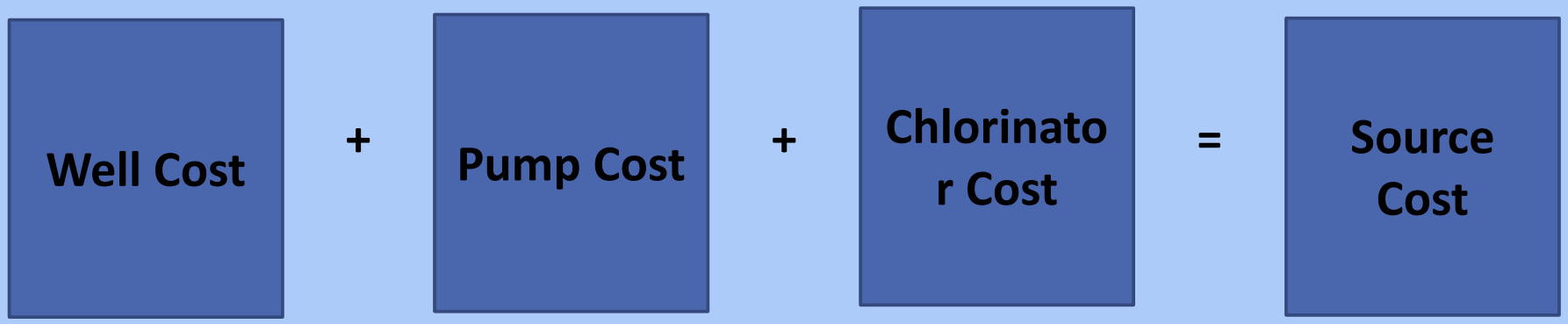
4. Chlorinator Cost. Estimate the Cost of Chlorinator using the following table.

Chlorinator	Cost
Small Well (300-500 households or 110-180 gpm)	$1,000 - $1,700
Medium Well (500-700 households or 180-225 gpm)	$1,700 - $2,600
Large Well (700-900 households or 255-330 gpm)	$2,600 - $3,900

- Consider multiple pumps and wells. It is a good idea to have redundant wells and pumps within a system to plan for problems with pumps, wells, or supply quantity. The same procedure may be followed for multiple wells.

Groundwater System Serving > 300 Households

5. Subtotal Cost for Water Source. Sum of Well Cost(s), Pump Cost(s), and Chlorinator Cost(s).



Groundwater System Serving > 300 Households

Storage Cost Estimating Procedure:

1. Consider factors affecting tank cost. Size, type of tank, construction conditions.
2. Determine storage needed.
   a. If replacing tank with sufficient size, estimate same size tank.
   b. If adding storage, the new tank size = total storage capacity – existing tank size.
   c. Approx. recommended total storage capacity = two-day use + fire flow storage (based on number of households served and assuming an average of 2.5 persons per household).

No. of Households	Min. Recommended Storage Volume (gallons)
300	260,000
400	330,000
500	400,000

Groundwater System Serving > 300 Households

4. Determine cost per gallon based on size of tank.

Size of Tank (gallons)	Cost Range ($/gallon)
Less than 50,000	$0.80 – $1.00
50,000 - 75,000	$1.00 - $1.20
75,000 - 300,000	$1.20 - $1.30
300,000 - 500,000	$1.30 - $2.50
500,000 – 1,000,000	$2.50 - $3.30

5. Multiply Storage Volume by Cost per Gallon to determine Total Tank Cost.

Storage Volume (gallons) **X** **Cost per Gallon** **=** **Total Tank Cost**

Groundwater System Serving > 300 Households

- Use 6- to 8-inch pipe for a general estimate.
- Cost includes the cost of standard construction, pipe materials, and labor.
- Rocky conditions = significantly higher cost
- Estimate the length of distribution pipe needed (Google Earth, GPS unity, or car odometer).
- Water Distribution Cost estimating procedure:
  1. Estimate cost per linear foot using the following table.

Pipe Diameter	Cost per Linear Foot	Notes
4-inch	$85	Maximum flow of 225 gpm
6-inch	$92	Minimum needed for fire flow
8-inch	$102	Maximum flow of 1,000 gpm
10-inch	$116	Maximum flow of 1,500 gpm

Groundwater System Serving > 300 Households

2. Multiply the Linear Feet of Distribution Pipe by the Cost per Linear Foot to obtain the Distribution Cost.

Linear Feet of Distribution Pipe **x** **Cost per Linear Foot** **=** **Distribution Cost**

- Estimate Total Project Cost by adding the Water Source Cost, Water Storage Cost, and Water Distribution Cost.

Source Cost **+** **Storage Cost** **+** **Distribution Cost** **=** **Total Project Cost**

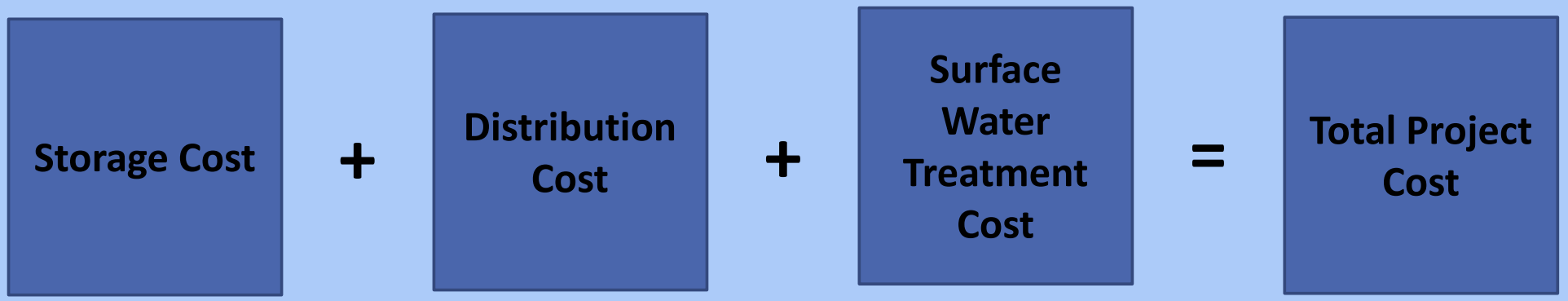
Surface Water Treatment System

- Costs for storage and distribution systems can be estimated using the previous groundwater system methods (depending on number of households).
- This method estimates construction costs for a new water treatment facility and does not include operations and maintenance costs.
- Rule of thumb = 2.5 persons per household and 100 gallons per capita per day.
- Estimate cost of surface water treatment system using the following table:

No. of Households	Size of Surface Water Treatment Facility	Cost per Gallon of Water
Greater than 3,000	1,000,000 gallons or more per day	$4.10
2,000 - 3,000	750,000 gallons or more per day	$5.10
1,500 - 2,000	500,000 gallons or more per day	$6.50
Less than 1,500	Less than 500,000 gallons per day	$8.40 - $9.70

Surface Water Treatment System

- Estimate Total Project Cost by adding Storage Cost, Distribution Cost, and Surface Water Treatment System Cost.



Cost Estimating

WASTEWATER INFRASTRUCTURE

Main Components of a Wastewater System

Collection	Treatment	Effluent Disposal
• Collects wastewater generated and conveys it to the treatment system/facility	• Treats the wastewater generated to meet permit requirements	• Disposes of treated effluent per permit requirements

Considerations for Choosing Treatment System/Facility

- Quality/quantity of flow
- Characteristics of raw influent wastewater
- Quality/quantity of effluent desired
- Type of discharge (surface water, groundwater, irrigation, etc.)
- Permit conditions
- Acceptable degree of O&M
- Quality/quantity of land available
- Physical characteristics of the area (soil, groundwater, bedrock, topography, etc.)

Considerations for Choosing Effluent Disposal Method

- Discharge to nearby surface water - need EPA NPDES permit.
- Discharge to groundwater (irrigation, infiltration, injection, etc.) - need NMED Groundwater Discharge permit.
- Discharge by evaporation - very land intensive.

Wastewater System Basis of Cost Estimation

- For collection and treatment only, not for discharge (too variable)
- Does not include ROW, land acquisition, or O&M
- New construction, not upgrade or expansion
- Flowrate of 100 gallons per capita per day (gpcd) and 2.5 persons per household are assumed.
- Does not include extreme conditions, such as dewatering, bedrock, etc.

Collection System Alternatives			
Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$66,500	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Vacuum Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$39,800	
Semi-Rural (1 - 3 acres per household)		$31,000	
Semi-Urban (0.5 - 1.0 acre per household)		$22,800	
Urban (Less than 0.5 acre per household)		$16,500	
Small Diameter Gravity Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$38,300	
Semi-Rural (1 - 3 acres per household)		$47,800	
Semi-Urban (0.5 - 1.0 acre per household)		$31,800	
Urban (Less than 0.5 acre per household)		$16,900	
Grinder Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$47,500	
Semi-Rural (1 - 3 acres per household)		$47,500	
Semi-Urban (0.5 - 1.0 acre per household)		$31,600	
Urban (Less than 0.5 acre per household)		$25,800	
Septic Tank Effluent Pump Collection System			
Classification	**No. of Households**	**Cost per Household**	**Subtotal**
Rural (3 - 5 acres per household)		$50,400	
Semi-Rural (1 - 3 acres per household)		$42,200	
Semi-Urban (0.5 - 1.0 acre per household)		$34,600	
Urban (Less than 0.5 acre per household)		$28,700	

Pump Station Estimated Cost

Classification	No. of Households	Cost per Household	Subtotal
Fewer than 100 households		$4,600	
100 to 500 households	100	$2,100	$210,000
More than 500 households		$900	

Treatment Facility Estimated Cost

No. of Households	Size of Wastewater Treatment Facility	Range of Cost per Gallon of Wastewater Treated
≤ 3,000	≤ 1,000,000 gallons per day	$17 - $26
> 3,000	> 1,000,000 gallons per day	$26 - $33

No. of Households x **250 gallons per household per day** x **Cost per Gallon** = **Treatment Facility Cost**

Cost Estimating

ROADWAYS INFRASTRUCTURE

Primary Roadway Construction Cost Components

- Earthwork – Cutting, Filling, Shaping
- Surfacing – Subgrade Prep, Base, Surface
- Drainage – Roadway, Cross Drainage
- Structures – Bridges, Retaining Walls
- Traffic – Signing, Striping, Signals, MOT
- Utilities – Adjustment of Existing Utilities
- Landscaping / Aesthetic Enhancements
- Other – Mobilization, Testing, Staking, etc.

Factors Affecting Roadway Construction Cost

- Terrain and Geographic Features
- Project Type - Rehabilitation, Reconstruction or New Construction
- Traffic Load / Roadway Function – Local, Collector, Arterial
- Urbanization – Curb & Gutter, Sidewalks
- Drainage Features
- Utilities Affecting Project
- Enhancements / Constraints – Safety, Environmental, Aesthetic, etc.

Average Earthwork Cost per Mile

Roadway Type	Driving Lanes	Road Top Width	Significant Cuts and Fills along Mainline	Major Widening in Mountain to Hilly Terrain	Widening in Flat to Moderate Terrain	Blading and Shaping Only
Local Streets	2 DL	24-28 ft	$470,000	$240,000	$140,000	$60,000
Collector	2 DL	36-40 ft	$770,000	$390,000	$220,000	$70,000
Collector	2 DL & CTL	52-56 ft	$1,000,000	$510,000	$270,000	$90,000
Collector	4 DL & CTL	72-76 ft	$1,330,000	$670,000	$340,000	$130,000

Average Roadway Surfacing Cost per Mile

- Urban sections – include curb and gutter

Roadway Type	Driving Lanes	Roadway Top Width	New Surfacing Constr. Hot Mix Asphalt (HMA)	Process Existing Surfacing and Overlay w/ Hot Mix Asphalt	Mill and Process Existing Surfacing & Overlay w/ Hot Mix Asphalt	New Surfacing Constr. Double Penetr.
Local Streets	2 DL	24-28 ft	$850,000	$570,000	$800,000	$470,000
Collector	2 DL	36-40 ft	$1,140,000	$1,020,000	$980,000	$0
Collector	2 DL & CTL	52-56 ft	$1,540,000	$1,360,000	$1,270,000	$0
Collector	4 DL & CTL	72-76 ft	$2,290,000	$1,920,000	$1,870,000	$0

Average Cost for Roadway Urbanization Enhancements per Mile

Item	Type	Cost/Mile
Curb and Gutter w/ Drive-pads and ADA Compliant Corners	New Construction – Both Sides of Roadway	$480,000
Sidewalk	New Construction – Both Sides of Roadway	$520,000
Raised Median Incl Curb & Gutter and Median Pavement	New Construction	$730,000
Raised Median Incl Curb & Gutter, No Median Pavement	New Construction	$280,000
ADA Compliant Corners and Drive-Pads	Street Rehabilitation	$190,000

Average Cost for Drainage Improvements

Structure	Unit	Unit Costs
Bridge/CBC (Large Drainage)	Surface Area	$420/SF
Storm Drain System	Per Center Line Mi	$3,240,000/Mi
Cross Drainage	24” CMP & End Treatment	$190/LF
	36” CMP & End Treatment	$290/LF
	48” CMP & End Treatment	$320/LF
	60” CMP & End Treatment	$360/LF

Other Construction Costs

Items	Type	Add % to Total Cost for Earthwork, Surfacing, Urbanization and Drainage
Mobilization		10%
Traffic Control	Signing, Striping, Management of Traffic	7.5%
Other	Quality Assurance, Utility Adjustments, Construction Staking, Demolition	7.5%
Signalization		$420,000/Signal

Example of Cost Estimate for 0.5 Mi of Local Street, Urbanized with 1- 60” CMP

Description	Unit	Unit Cost	Amount
Earthwork – Widening (flat to moderate) ½ Mi	Mi	$150,000	$80,000
Surfacing – New Surfacing ½ Mi	Mi	$860,000	$440,000
Urbanization – New Constr. w/ Curb & Gutter, ADA Compliant Drive-pads and Corners – ½ Mi	Mi	$480,000	$240,000
Drainage – 80 LF of 60” CMP & End Treatments	LF	$20,000	$40,000
		Subtotal	**$800,000**
Mobilization, Traffic and Other Costs	%	25% of Subtotal	$200,000
		Subtotal	**$1,000,000**
Gross Receipts Tax and Contingencies	%	28% of Above	$280,000
Construction Cost			$1,250,000
Engineering and other Professional Costs	%	22% of Constr.	$275,000
		Total Project Costs	**$1,525,000**

Cost Estimating

BUILDINGS

Primary Building Construction Components

- Civil- Site, Parking Lot
- Structural – Foundation, Str Framework Mechanical – Plumbing, HVAC
- Electrical – Wiring, Lighting
- Fire Suppression – Sprinkler, Alarms
- Architectural – Thermal/Moisture Interior/Exterior Finishes
- Landscaping

Factors Affecting Building Specific Costs

- Site Terrain and Availability of Utilities
- Soil Conditions
- Structural Complexity
- Exterior and Interior Finish Levels
- General Building Construction Type
- Heating, Venting, Cooling System Level

Administration Buildings

Population to be Served	Range of Typical Building Size	Typical Cost Per Square Foot (SF)
Under 5,000	2,000 to 5,000 SF	$290
5,000 to 10,000	5,000 to 6,500 SF	$280
Over 10,000	6,500 to 8,000 SF	$250

Community Centers

Population to be Served	Range of Typical Building Size	Typical Costs per Square Foot (SF)
Under 8,000	10,000 to 20,000 SF	$230
Over 8,000	20,000 to 30,000 SF	$210

Fire Stations

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 SF	$330
2,000 to 5,000	4,000 SF	$290
5,000 to 10,000	6,000 SF	$240
Over 10,000	8,000 SF	$230

Libraries

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 2,000	2,000 to 2,500 SF	$370
2,000 to 5,000	2,500 to 3,500 SF	$370
5,000 to 10,000	3,500 to 7,000 SF	$370
Over 10,000	7,000 SF to 10,000 SF	$350

Maintenance Buildings

Population to be Served	Typical Building Size	Typical Cost per Square Feet (SF)
Under 5,000	10,000 SF	$210
5,000 to 10,000	20,000 SF	$170
Over 10,000	30,000 SF	$160

Site Work

- Dependent on number of parking spaces required. Use 1 parking space for every 300 SF of building space.
- Cost includes grading and shaping, subgrade prep, base course, hot mix asphalt, curb, and front sidewalk.
- For construction cost use **$3,370 per Parking Space**.

Example of Cost Estimate for New Library– 6,000 SF

Description	Unit	Unit Costs	Amount
Building	6000 SF	$370/SF	$2,220,000
Site Work	20 Parking Spaces	$3,370/ Parking Space	$67,400
		Sub-Total	**$2,287,400**
GRT		8% of above	$182,992
		Sub-Total	**$2,470,392**
Architectural / Engineering		15% of above	$370,559
Total			**$2,850,000**
Add 35-50% for Market Escalation			$997,500 - $1,425,000
Total Project Cost			**$3,847,500 - $4,275,000**

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Questions?